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(54) Whey protein food product base.

(57) A process produces a food product which is characterized by a creamy smooth mouth feel such as is found in a high fat content food product. The process includes mixing a whey protein concentrate with water or a water-base compound in an amount to form a food product base having a whey protein food fraction in the food product base in the range of approximately 3.0 to 7.5%. Condiments and flavors are then added to the food product base.

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have been removed or eliminated from food products such as salad dressings, cheese spreads and various other dairy products.

#### SUMMARY OF THE INVENTION

05           The present invention is a food product base and a process for preparing the same. The process includes mixing a whey protein concentrate having a functional whey protein fraction with water or a  
10           water-based compound in an amount so that the whey protein fraction in the food product base is in the range of approximately 3.0 to 7.5% by weight. The mixture is then heated to a temperature that reacts the water with the protein to form the food product base.

15           Preferably, the whey protein concentrate has a functional protein content of approximately 30% and is dry blended with the vegetable oil and then mixed with a milk-derived compound to obtain the final functional whey protein fraction in the food product  
20           base. The hydration of the water with the protein results in a food product base that, when mixed with other flavorings and condiments, provides a low fat final food product having a mouth feel such as a high fat food product.

#### 25           BRIEF DESCRIPTION OF THE DRAWING

The Figure is a flow diagram of the process of the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

30           The process of the present invention is a process that produces a food product base characterized by a creamy smooth mouth feel as is found in high fat content food product such as a high fat salad dressing. The process includes mixing a whey protein concentrate (WPC) with water or a

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fraction of the WPC is not particularly important to the present invention. WPCs having other functional whey protein fractions are also used but in amounts to achieve an approximate range of 3.0 to 7.5% of whey protein in the food product base.

Typically, products such as salad dressings have a pH of below 4.6 to meet packaging requirements set by governmental agencies. Whey proteins are preferred in the process of the present invention since, unlike casein proteins or soybean proteins, whey proteins do not precipitate out of solution under the conditions of the process to be discussed subsequently. Instead, as will be explained subsequently, the whey proteins stay in solution and react with water to impart the desired characteristics in the final food product base when prepared by the process of the present invention.

Referring to the flow diagram of the Figure, a WPC having approximately a 30% whey protein fraction by weight in vessel 10 is mixed with a vegetable oil in preferably a ribbon blender 12. The vegetable oil can be any of the various vegetable oils such as corn oil or cottonseed oil with corn oil being preferred. The WPC and the corn oil are blended in preferably a 4/1 ratio.

The WPC/oil mixture is conveyed into a conventional high speed blender 16 and mixed with water or a water-based compound such as a dairy product in vessel 18.

The dairy product can be cultured buttermilk, sour cream or the like. The type of water-based compound used depends on the flavor desired in the final food product. For example, if the food product base is being used as a salad

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period of time, since blender 16, only an insignificant portion of the protein has been denatured. The protein has been processed at low temperatures (below 150°F) through the steps described previously to maintain the functionality of the whey protein until the present process step.

Preferably, the product is heated to approximately 180°F in a swept-surface heat exchanger 30. However, any other type of vessel that produces the desired results is within the scope of the invention.

The heating of the mixture is believed to do at least two things. First, the heating denatures the whey protein, allowing the protein to expand as fully as possible. The expansion of the protein results in an increase in viscosity of the mixture and the high fat mouth feel. Second, if the acid has been added prior to the swept-surface heat exchanger 30 lowering the pH below 4.6, the product is also sterilized at the relatively low temperature of 180°F.

The swept-surface heat exchanger provides a preferable manner of denaturing the whey protein. It has been found that the functional whey protein gels properly as a function of time and temperature. In a swept-surface heat exchanger, the protein contacts the heated surface and is then swept away by the paddles. It is believed that this contact time at 180°F is less than one second. A longer time at 180°F will result in the protein coagulating, resulting in the product having a grainy texture.

If acid has not been added to the food product base before the swept-surface heat exchanger, acid is then added after the swept-surface heat exchanger for packaging purposes. Adding the acid

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that the viscosity of the food product base provides a reasonable quantitative measure for ensuring that the food product base will implant the desired mouth feel. Although viscosity does not measure texture or mouth feel, it has been found that if the food product base has a viscosity outside the range of 88,000 centipoise to 2,800,000 centipoise, it will not have the mouth feel required for resembling a full fat food product. An amount of functional whey protein less than approximately 3.0 percent by weight of the base produces a thin watery food product and an amount of functional whey protein above approximately 7.5% by weight of the base produces a very viscous pasty grainy product which does not impart the desired high fat characteristic. An amount of functional whey protein in the approximate range of 3.0 to 4.5 is preferred in the examples discussed subsequently.

The following examples are presented to illustrate food products that the present invention has been used for. The examples are not intended to limit the scope of the present invention.

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Ingredients		Percent By Weight
	WPC*/Corn Oil **	16.5
	Sour Cream	30.3
05	Cream (30% butterfat)	10.0
	Water	43.2
TOTAL:		100.0

\*WPC having approximately 30% functional whey protein fraction.

10 \*\*Functional whey protein fraction = 3.96%.

In addition to the sour cream, cream and water, vinegar was also added to the WPC/oil mixture in the high speed blender. The vinegar is not considered as part of the food product base since the food product base can be made without the addition of vinegar and the vinegar is added for taste and packaging purposes.

After the high speed blender, the mixture was processed through a colloid mill to remove any lumps that have been formed in the previous mixing steps and was then processed through a single-stage homogenizer to increase the opaque qualities of the finished product. Seasoning, sugar, salt, starch and guar/locust bean gum were then added. The emulsion was processed through a Cherry-Burrell swept-surface heat exchanger at approximately 180°F to achieve a viscosity of approximately 150,000 centipoise.

Bacon bits and cheese were added to the viscous mixture to form the final product. The Cheese and Bacon salad dressing was creamy, having a mouth feel like a high fat Cheese and Bacon salad dressing.

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Example II

A French salad dressing was prepared having the following formula:

	Ingredients	Percent By Weight
05	Water	30.70
	Sour Cream	22.80
	Ketchup	17.00
	WPC*/Corn Oil **	11.10
10	Cream (30% butterfat)	7.57
	Sugar	5.00
	Seasoning Blend	1.83
	Vinegar (200 grain)	2.67
	Starch	1.00
15	Oleoresin Paprika	0.09
	Guar/Locust bean gum	0.05
	Onion Powder	0.19
TOTAL:		100.00

20 \*WPC having approximately 30% functional whey protein fraction.

\*\*Functional whey protein fraction in base = 3.69%.

25 The food product base for the French salad dressing was prepared substantially as described in Example I. Ketchup, sugar, seasoning blend, starch, oleoresin paprika and guar/locust bean gum was added to the food product base to achieve a French salad dressing taste. The results were a French salad dressing having a mouth feel similar to a high fat French salad dressing.

30 Although a specific composition of a French salad dressing is described in Example II, it is believed that the following ingredient ranges in

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Ingredients	Percent By Weight
Water	42.34
Sour Cream	28.00
05 WPC*/Corn Oil **	13.70
Cream (30% butterfat)	9.40
Seasoning Blend	3.15
Starch	1.60
Salt	1.40
10 Onion Oil	0.01
Garlic Oil	0.04
Lactic Acid (88% by weight)	0.26
Citric Acid	0.06
Guar/Locust bean gum	0.04
15	TOTAL: 100.00

\*WPC having approximately 30% functional whey protein fraction.

\*\*Functional whey protein fraction in base = 3.52%.

20 The food product base of the Creamy Italian salad dressing was prepared substantially the same as the food product base in Example I except that lactic and citric acid were added to the mixture in the high speed blender instead of vinegar. Seasoning blend, starch, salt, onion oil, garlic oil and guar/locust

25 bean gum were subsequently added to the food product base. The Creamy Italian salad dressing had a mouth feel and taste of a full fat Creamy Italian salad dressing.

30 Although a specific composition of a Creamy Italian salad dressing is described in Example III, it is believed that the following ingredient ranges in weight percent will produce a very satisfactory



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05 The food product base for the Ranch salad dressing was prepared substantially as described in Example I except that lactic acid was added in the high speed blender instead of vinegar. A seasoning blend, starch, garlic and gum were added subsequently. The result was a Ranch-Style dressing having a taste and mouth feel of a high fat content Ranch salad dressing.

10 Although a specific composition of a Ranch salad dressing is described in Example IV, it is believed that the following ingredient ranges in weight percent will produce a very satisfactory salad dressing using the process of the present invention.

Water: 40.0-56.0

15 Sour Cream: 10.0-30.0

WPC/Corn Oil (whey protein fraction = 30%):  
13.0-18.0

Cream (30% butterfat): 0.0-10.0

Seasoning Blend: 0.5-6.0

20 Starch: 0.0-3.0

Lactic Acid (88% by weight): 0.5-4.0

Garlic Oil: 0.05-1.0

Guar/Locust bean gum: 0.0-0.3

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weight percent will produce a very satisfactory salad dressing using the process of the present invention.

Water: 27.0-41.0

Sour Cream: 10.0-30.0

05 WPC/Corn Oil (whey protein fraction = 30%):  
11.0-17.0

Cream (30% butterfat): 0.0-10.0

Blue Cheese 6.0-20.0

Seasoning Blend: 0.5-3.0

10 Starch: 0.0-3.0

Salt: 0.25-3.0

Vinegar (200 grain): 0.5-4.0

Guar/Locust bean gum: 0.0-0.3

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Although a specific composition of a  
Thousand Island salad dressing is described in  
Example VI, it is believed that the following  
ingredient ranges in weight percent will produce a  
very satisfactory salad dressing using the process of  
the present invention.

Water: 25.0-40.0

Sour Cream: 10.0-30.0

WPC/Corn Oil (whey protein fraction = 30%):

9.0-15.0

Cream (30% butterfat): 0.0-10.0

Relish: 2.0-12.0

Ketchup: 0.0-15.0

Seasoning Blend: 1.0-8.0

Sugar: 0.5-5.0

Salt: 0.5-3.0

Starch: 0.0-3.0

Mustard Flour: 0.05-1.5

Lactic Acid (88% by weight): 0.1-1.0

Guar/Locust bean gum: 0.0-0.3

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salad dressing using the process of the present invention.

Water: 35.0-50.0

Sour Cream: 10.0-30.0

05 WPC/Corn Oil (whey protein fraction = 30%):  
11.0-17.0

Cream (30% butterfat): 0.0-10.0

Parmesan Cheese: 0.0-12.0

Vinegar (200 grain): 0.5-3.0

10 Starch: 0.0-3.0

Lactic Acid (88% by weight): 0.1-1.5

Seasoning Blend: 0.5-4.0

Guar/Locust bean gum: 0.0-0.3

#### Example VIII

15 The food product base was also used as a base for a sour cream product. The sour cream product had a taste and mouth feel of a full fat sour cream. The sour cream product had the following composition:

20	<u>Ingredients</u>	<u>Percent By Weight</u>
	Water	50.60
	Sour Cream	32.90
	WPC*/Corn Oil **	12.85
25	Starch	1.58
	Nonfat Milk Solids	0.99
	Lactic Acid	0.99
	Sour Cream Flavoring	0.09
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	TOTAL:	100.00

30 \*WPC having approximately 30% functional whey protein fraction.

\*\*Functional whey protein fraction in base = 3.20%.

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Although a specific composition of a sour cream product is described in Example VIII, it is believed that the following ingredient ranges in weight percent will produce a very satisfactory sour cream product using the process of the present invention.

Water: 37.0-69.0  
Sour Cream: 10.0-50.0  
WPC/Corn Oil (whey protein fraction = 30%)  
9.3-17.4  
Starch: 1.0-3.0  
Nonfat Milk Solids: 0.0-4.0  
Lactic Acid: 0.25-1.5  
Sour Cream Flavoring: 0.02-0.15  
Agar: 0.0-0.3

Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

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8. The process of claim 1 wherein a food grade acid is added to the food product base to lower the pH below approximately 4.6.
9. The process of claim 1 wherein the water-based composition is a milk-derived composition.
10. The process of claim 1 wherein the heating is effected in a swept-surface heating device.
11. The process of claim 1 wherein the functional whey protein fraction is in the approximate range of 3.0 to 4.5% by weight of the food product base.
12. A Bacon and Cheese salad dressing comprising the food product base produced by the process of claim 1 and Bacon and Cheese flavor ingredients.
13. A French salad dressing comprising the food product base produced by the process of claim 1 and French flavor ingredients.
14. A Creamy Italian salad dressing comprising the food product base produced by the process of claim 1 and Creamy Italian flavor ingredients.
15. A Ranch salad dressing comprising the food product base produced by the process of claim 1 and Ranch flavor ingredients.
16. A Blue Cheese salad dressing comprising the food product base produced by the process of claim 1 and Blue Cheese flavor ingredients.

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Cream (30% butterfat): 0.0-10.0  
Sugar: 3.0-9.0  
Cheese: 1.0-10.0  
Seasoning Blend: 1.5-7.0  
Vinegar (200 grain): 1.0-5.0  
Bacon Bits: 0.5-4.0  
Salt: 0.5-3.0  
Starch: 0.0-3.0  
Guar/Locust bean gum: 0.0-0.3

24. The food product of claim 22 wherein the food product is a French salad dressing having the following composition in approximate weight percent:

Water: 25.0-40.0  
Sour Cream: 10.0-30.0  
Ketchup: 0.0-20.0  
WPC/Corn Oil (whey protein fraction = 30%):  
9.0-15.0  
Cream (30% butterfat): 0.0-10.0  
Sugar: 1.0-10.0  
Seasoning Blend: 0.5-4.0  
Vinegar (200 grain): 1.0-5.0  
Starch: 0.0-3.0  
Oleoresin Paprika: 0.0-0.3  
Guar/Locust bean gum: 0.0-0.3  
Onion Powder: 0.0-1.0

25. The food product of claim 22 wherein the food product is a Creamy Italian salad dressing having the following composition in approximate weight percent:

Water: 40.0-56.0  
Sour Cream: 10.0-30.0  
WPC/Corn Oil (whey protein fraction = 30%):  
13.0-18.0

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Seasoning Blend: 0.5-3.0  
Starch: 0.0-3.0  
Salt: 0.25-3.0  
Vinegar (200 grain): 0.5-4.0  
Guar/Locust bean gum: 0.0-0.3

28. The food product of claim 22 wherein the food product is a Thousand Island salad dressing having the following composition in approximate weight percent:

Water: 25.0-40.0  
Sour Cream: 10.0-30.0  
WPC/Corn Oil (whey protein fraction = 30%):  
9.0-15.0  
Cream (30% butterfat): 0.0-10.0  
Relish: 2.0-12.0  
Ketchup: 0.0-15.0  
Seasoning Blend: 1.0-8.0  
Sugar: 0.5-5.0  
Salt: 0.5-3.0  
Starch: 0.0-3.0  
Mustard Flour: 0.05-1.5  
Lactic Acid (88% by weight): 0.1-1.0  
Guar/Locust bean gum: 0.0-0.3

29. The food product of claim 22 wherein the food product is a Parmesan salad dressing having the following composition in approximate weight percent:

Water: 35.0-50.0  
Sour Cream: 10.0-30.0  
WPC/Corn Oil (whey protein fraction = 30%):  
11.0-17.0  
Cream (30% butterfat): 0.0-10.0  
Parmesan Cheese: 0.0-12.0



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heating the mixture to a temperature that  
reacts the protein with the water.

33. The process of claim 32 wherein the mixture is heated to a temperature range of approximately 170°F to 212°F and being in contact with a heating surface for less than one second.